



Research Report 1966

**Comparison of Direct Instruction and Problem
Centered Instruction for Army Institutional Training**

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April 2013

**United States Army Research Institute
for the Behavioral and Social Sciences**

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COMPARISON OF DIRECT INSTRUCTION AND PROBLEM CENTERED INSTRUCTION FOR ARMY INSTITUTIONAL TRAINING

EXECUTIVE SUMMARY

Research Requirement:

One tenet of the Army Learning Model (ALM) for 2015 (U.S. Army, 2011) is that institutions transform existing instruction and develop new “context-based, collaborative, problem-centered instruction (PCI).” There is no guarantee that in all cases a pivot to PCI will result in more effective training (cf. Kirschner, Sweller & Clark, 2006; Mayer, 2004) or that any gains due to PCI will justify the effort involved in making the pivot. Further, there is evidence that PCI is more suited to ill-defined subject domains, while direct instruction (DI) is more suited to well-defined subject domains (Tobias and Duffy, 2009). This research addressed the question: Given a “real-world” Army institutional training environment, is there an operationally significant interaction between type of instruction (PCI or DI) and type of subject domain (well-defined or ill-defined)?

Procedure:

A DI based and a PCI based version of an existing Army training module [Noncommissioned Officer (NCO) Evaluation Report Preparation] were constructed and each administered to different Infantry Advanced Leader Course classes. A common post-test addressing both the well-defined and the ill-defined elements of the module was administered to all students. Also, both the DI and PCI students’ attitudes toward the effectiveness of the module were assessed. The hypotheses were that (1) both DI and PCI students’ performance overall would benefit from the training, (2) DI students would out-perform PCI students on tests of well-defined elements, while PCI students would out-perform DI students on tests of ill-defined elements and that (3) PCI students would have a more positive attitude toward PCI than the DI students would have toward DI.

In parallel, the resources required to construct and to administer and maintain the existing NCO Evaluation Report Preparation module, the DI version of the module, and the PCI version of the module were surveyed to allow a rank order determination of the resourcing requirements of the module versions.

Findings:

For both DI and PCI, as assessed by the pre-test and post-test, students performed significantly better after instruction, with neither instructional method superior to the other. The expected interaction between type of instruction and subject domain type was not observed. Also, PCI students consistently valued their training more highly than did DI students, although this difference was marginally significant.

Additionally, the PCI module was found to require the most resources, the DI module, less, and the existing module the least resources.

The overall performance improvement regardless of instructional method indicates that, as hypothesized, with a focused development effort, it is possible to measurably improve the effectiveness of existing training. The failure to find an interaction between instructional method (DI or PCI) and subject domain type (ill or well defined) should be interpreted as a precaution: although both DI and PCI methods can be effective, it may not be the case that one is measurably more effective than the other, even when training subject domain type is taken into account.

Considerations for trading off training effectiveness versus required training resources were addressed.

Utilization and Dissemination of Findings:

Results were briefed to the Henry Caro Noncommissioned Officer Academy (NCOA) at the United States (US) Army Maneuver Center of Excellence, Fort Benning, GA. The NCOA Advanced Leaders Course has incorporated a version of the NCO Evaluation Report preparation block of instruction into its current curriculum.

COMPARISON OF DIRECT INSTRUCTION AND PROBLEM CENTERED INSTRUCTION FOR ARMY INSTITUTIONAL TRAINING

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COMPARISON OF DIRECT INSTRUCTION AND PROBLEM CENTERED INSTRUCTION FOR ARMY INSTITUTIONAL TRAINING

Introduction

The stated purpose of the updated Army Learning Model (ALM) elaborated in *The United States (U.S.) Army Learning Concept for 2015* (U.S. Army, 2011) is to meet the “Army’s need to develop adaptive, thinking Soldiers and leaders capable of meeting the challenges of operational adaptability in an era of persistent conflict” (p. 2). In fulfilling this purpose, the ALM prescribes that the Army begin, as appropriate, transforming existing instruction and developing new “context-based, collaborative, problem-centered instruction” (p. 19).

Problem-centered instruction (PCI) is an instructional approach in which problem solving is used as a vehicle for knowledge acquisition and for improvement of problem-solving skills (Hmelo-Silver, 2004). It is characterized as being instructor facilitated (vice instructor led), being focused on relevant exemplar problems, and emphasizing the learner’s contextual understanding of the subject matter (cf. Duffy & Raymer, 2010). As such, PCI represents a sizable departure from the Army’s historical framework of direct instruction (DI), which in contradistinction has been characterized as relatively inflexible, instructor led, and focusing on individual tasks, conditions, and standards primarily through lecture (U.S. Army, 2011).

Given that the ALM prescribes the use of PCI, there are at least two practical implementation issues the Army faces: (1) when PCI is applied appropriately, what is the gain in training effectiveness? and (2) what typical cost elements might be associated with adding PCI to the Army institutional training environment?

These two issues are inter-related. The first issue addresses the practicality to the Army of implementing PCI. Although there are strong voices of caution (cf. Kirschner, Sweller & Clark, 2006; Mayer, 2004), ALM assumes the general relative superiority of problem-based instructional approaches compared to approaches based in DI. If this superiority does indeed hold true, then to objectively justify a shift to PCI, the Army should be able to show that with PCI there is a concomitant gain in training effectiveness.

Moreover, this concomitant gain must more than offset the resources required to make and to maintain the shift from DI to PCI. This consideration raises the second issue – to assess the degree of resource offset, the Army needs a characterization of the current (DI-related) and proposed (PCI-related) elements of cost associated with instruction. Once these elements are characterized, Army costing procedures can be invoked to begin determining actual costs.

Within the issue of assessing the effectiveness of PCI and DI approaches is the further issue of the characteristics of the material to be learned, or the learning domain. Some domains, such as a data entry task, are relatively well defined, with explicit processes and standards. Other domains, such as crafting written descriptive evaluations of Soldiers’ job performance, are relatively ill defined, with few explicit processes or standards. In general, DI is assumed more appropriate for a well-defined domain of learning, while PCI is assumed more appropriate for an ill-defined domain of learning (Clark, 2004; Tobias & Duffy, 2009). Thus, current theoretical

views of PCI and DI would dictate that any comparison between the two must take into account their respective assumed strengths and weaknesses relative to the degree of “definition” of the learning domain(s) used in the comparison.

This investigation used an existing Army block of instruction, with some Soldiers instructed via DI methods and other Soldiers via PCI methods. Then, all Soldiers’ post-instruction performance on all the well-defined and on all the ill-defined elements of the instructional domain was assessed. DI Soldiers’ performance on ill-defined vs. well defined elements was compared, as was PCI Soldiers’ performance on ill-defined vs. well defined elements. Additionally, during preparation of the instructional materials and during actual presentation and assessment of instruction, the resources required for each method were characterized and roughly estimated.

The following sections give in more detail the background of the research, the research methods used, the research results, and the implications of the results.

Background

Considerations in Applying the 2015 Learning Model

The application of the 2015 learning model in the Army institutional training environment, while theoretically appealing, will be challenging to execute given the existing learning culture and practical constraints that impact and shape classroom training. While the problem-centered approach (and its many variants) promoted by the 2015 learning model can be effective in improving adaptive responding it is also clear that this approach may not be best suited for training all skill areas, e.g., procedural based tasks with clear solutions, or all students, e.g., advanced learners (Clark, 2004).

Recent research (e.g., Pleban, Graves et al., 2011; Pleban, Vaughn, Sidman, Semmens & Geyer, 2011; & Tucker, Semmens, Sidman, Geyer, & Vaughn, 2011; U.S. Army, 2011) provides some support for Clark’s (2004) major conclusions, indicating that the effectiveness/utility of a specific training strategy (i.e., direct instruction versus problem centered) will depend on a number of factors such as learning objectives, time allotted for instruction, available resources, preparation of instructor, and level of experience of the learner.

Framework for Transforming Army Training and Education and Development (ATED)

Previous Army publications have emphasized the importance of multiple instructional strategies and selecting the best approach based on such factors as course content, training objectives, and learner experience. As a prime example, Training and Doctrine Command (TRADOC) Pamphlet 350-70-4, *Guide to Army Training and Education Development: Process, Frameworks, Models, and Efficiencies* (U.S. Army, 2009) identifies DI and PCI as the major models for instruction. These two instructional approaches are briefly described in the following sections.

Direct instruction-DI: Overview. Guided by Merrill's (2009) first principles of learning, DI is often associated with "modeling" expert performance. This approach is based on the premise that someone can learn to perform a task or solve a problem in the same way as an expert. DI represents a part to whole approach to learning. It involves dividing the learning material into chunks, connecting new knowledge to existing knowledge (in the learner), typically through lecture, and demonstrating how to perform each chunk. This is followed by practice opportunities. Critical information can be provided through varied platforms to include not only lecture but also readings (e.g. case-based studies), handouts, and interactive multimedia instruction.

Feedback is provided during practice and learners are assessed on their ability to perform the task or solve the problem. After practicing small chunks, learners are presented with another problem scenario and allowed to practice solving the entire problem.

It should be noted that DI is sometimes regarded as the "lecture" approach in which the instructor provides knowledge to a passive learner. However, good DI involves more than just a lecture. It requires well trained, knowledgeable instructors who are actively involved in demonstrations, monitoring practice, evaluating learning, and providing the appropriate feedback (i.e., information that helps learners identify the strengths and weaknesses in their performance while providing strategies for improvement).

Guidelines for when to use DI as the instructional strategy. TRADOC Pamphlet 350-70-4 (2011) provides clear guidelines for when to select DI as the instructional strategy. First, DI should be considered when the objective is to prepare students to perform a task or solve a problem in the same manner as someone who is an expert in that content area. Second, DI is most often the more appropriate choice when the training objective involves learning to solve well-structured problems (e.g., learning how to operate a lathe, repair a radio) with a clear solution. Finally, DI is more appropriate for students who are novices in the learning topic.

Cautions when using DI as an instructional strategy. DI may be inappropriate if the target audience is already expert in the subject being taught. Presentation of basic factual information, concepts and simplistic (part) tasks risk losing the attention of the experienced audience who may view the instruction as providing little challenge or incentive to excel. In addition, instructors must be prepared to execute DI using instructional interventions that engage learners in all aspects of the learning event. Learning how to conduct good DI must be clearly addressed in faculty training/education programs.

Problem-centered instruction-PCI: Overview. PCI represents a whole to part approach to learning in that the students are presented with a problem or several problems first which requires them to develop a solution(s) and/or identify underlying principles for addressing similar types of problems in future, but differing situations. The instructor's role in PCI is to serve as a facilitator of knowledge as opposed to directing the students' thinking. The instructor provides lectures on key learning points after the students have had an opportunity to work on the problem(s) and to formulate a solution.

Guidelines for when to use PCI as the instructional strategy. PCI should be considered when the objective is to prepare students to function in uncertain, ambiguous or evolving situations, e.g., leadership, stability operations, organizational effectiveness. In general, PCI is viewed as most appropriate when addressing ill-structured problems, e.g., leadership, where there is no clear or single correct solution.

Cautions when using PCI as an instructional strategy. PCI is more appropriate when the students are already expert (or are familiar with the area). The rationale provided is that the more sophisticated learners will view the requirements to investigate, research and develop solutions for problems not seen before as challenges to grow and excel within their field. They will thus be less likely to be overwhelmed (and more likely to learn) than students unfamiliar with the topic area in question (U.S. Department of the Army, 2009).

PCI instructors. As was the case for DI, to conduct an effective course based on PCI principles will require extensive instructor preparation. Cianciolo, Grover, Bickley, and Manning (2011) identified key instructor competencies that are needed to orchestrate an effective PCI driven course. These competencies fall into two categories: classroom management and learning facilitation. With regard to classroom management activities, developing productive PCI-based learning requires that the instructor prioritize learning objectives, structure problems and assessment activities, and anticipate the most likely areas of student difficulty. Specific competencies associated with classroom management include: specifying the knowledge and skill acquisition objectives for the course; developing problems to trigger and situate the learning process; and constructing a problem “roadmap” that provides structure that guides the assessment and understanding of students and scaffolds learners’ development of cognitive skill.

The second competency category, learning facilitation, refers to what instructors do in real time to insure that students remain active and in charge of their learning while keeping learning on track to meet course requirements. Key instructor competencies for this category include: real-time monitoring and assessment of student performance; role modeling the problem-solving process to help students understand how to approach and solve complex problems; and facilitating group discussion and collaboration in order to support knowledge acquisition and give students a model of successful collective problem solving.

Training Issues and Implications

Careful review of TRADOC Pam 350-70-4 (U.S. Army, 2009) suggests that the PCI approach described comprises a broad range of student-centered instructional methods. PCI is based in research which suggests that, by having them learn through problem-solving experiences, students can learn both content as well as thinking strategies. To expand on the description provided earlier, in PCI, students learn through facilitated problem solving. More specifically, learning centers on a complex problem that does not have a single correct answer. Students work in collaborative groups to identify what they need to learn to solve a problem. They engage in self-directed learning and then apply their new knowledge to the problem. They then reflect on what they learned and the effectiveness of the strategies employed. In this approach, the instructor’s role is to facilitate the learning process rather than provide knowledge. Because students are self-directed, managing their learning goals and strategies to solve ill

defined problems, they are able to, presumably, acquire the skills needed for lifelong learning (Hmelo-Silver, 2004; see also Hmelo-Silver, Duncan, & Chinn, 2007).

Currently, there is little empirical research performed on the training value/impact of PCI when implemented in an Army institutional classroom setting. Additionally, issues involving classroom organization such as fixed time length instructional periods in military classroom training environments (of shorter duration than might be optimal for PCI), skill levels of current instructors to serve as course facilitators versus lecturers, and the relatively high student/instructor ratio (40:1) in many military classrooms may limit the applicability of this particular approach. These practical limitations have led some researchers (Tucker et al., 2011; Pleban, Graves et al., 2011; Pleban, Vaughn et al., 2011) to examine the feasibility of implementing alternative PCI strategies in Army institutional classroom settings.

Contrasting cases/invention: Overview. One strategy that has received scrutiny as one of the approaches to PCI is contrasting cases/invention. Contrasting cases/invention are two instructional design features used to enhance deep understanding of subject matter materials. The approach was developed to help people construct new knowledge for themselves and become more adaptive/effective problem solvers (Schwartz & Bransford, 1998; Schwartz & Martin, 2004). A key objective of this problem-centered approach is to optimize the use of lectures/reading materials to develop these skills. Schwartz and Bransford argue that the value of lectures can be enhanced if the student is able to map information from the lecture or text into the knowledge of the problem situation that they have already developed as a result of their prior experiences. A key assumption of this strategy is that the student can activate the prior knowledge. Schwartz and Bransford propose a way for activating this prior knowledge through the use of contrasting cases/invention. Based on theories of perceptual learning that emphasize differentiation (e.g., Bransford, Franks, Vye, & Sherwood, 1989), providing students with opportunities to analyze sets of contrasting cases (e.g., analyzing the results from different experiments, key aspects of different theoretical models) can help them become sensitive to information that they might not otherwise notice. Contrasting cases help attune people to specific features and dimensions that make the cases distinctive. The refined information provides the foundation for guiding other activities such as creating images, elaborating, and generating questions, which can enhance development of adaptive problem solving skills.

According to Schwartz and Martin (2004), contrasting cases can help people pick up or notice distinctive features; however, it is their actions that are critical for helping them discern the structures that organize those features. To make contrasting cases effective, learners need to undertake productive activities that lead them to notice and account for contrasts in the different cases. Schwartz and Martin use the term invention to describe this process. Invention involves production activities, like inventing solutions that can be particularly beneficial for developing early knowledge and facilitating learning. These solutions could, for example, be in the form of graphs, or general formulas. Invention can help develop and/or clarify interpretations of the problem in question by forcing students to notice inconsistencies in their approach or mental model of their solution and work to reconcile them. This, in turn, provides the knowledge that will prepare them to learn from subsequent instruction (lectures) with deeper understanding (Schwartz, Sears, & Chang, 2008).

To optimize deep understanding of the subject matter material, Schwartz and colleagues advocate a particular sequencing of events. Students first try to solve novel problems without guidance/instruction, to “invent” potential solutions to the problem. Then, they receive DI and demonstrations regarding the tasks. Finally, they apply what they have learned to novel situations. For example, students might analyze data sets from classical experiments and attempt to graphically display the general phenomena from the data. Or, they might be asked to invent a model or formula that will accurately describe the concept (e.g., reliability or correlation). This would be followed by a lecture and (sometimes) class discussion and possibly a demonstration. Finally, students would be presented with new problems and asked to make predictions concerning the outcomes of new experiments or apply the formula or model to solve another (novel) problem (Schwartz, Bransford, & Sears, 2005; Schwartz & Martin, 2004).

While contrasting cases/invention is a critical part of Schwartz’ approach, the lecture component (DI) is equally valuable. It offers a higher level explanation of the concept/phenomena that would be quite difficult and time consuming for the student to discover on his or her own. The higher level explanation is important because it provides a generative framework that can extend one’s understanding beyond the specific cases that have been analyzed and experienced (Schwartz & Black, 1996) and thus, enhances adaptive problem solving (transfer). By sequencing the lecture following invention/contrasting cases, a “time for telling” is created that increases the learning value of the lecture as students are now better prepared to grasp the deeper implications of the lecture as a result of their earlier discovery activities (Schwartz & Bransford, 1998). Schwartz, Bransford, and Sears (2005) present evidence that the most effective design combination includes both opportunities for invention and analysis (contrasting cases) followed by opportunities for learning efficient solutions derived by experts (typically) presented in lecture format.

To date, contrasting cases/invention has been used to train ethical decision-making skills with United States Military Academy cadets (Pleban, Graves et al., 2011), and mission planning skills with second lieutenants attending the Infantry Basic Officer Leader Course (Tucker et al., 2011; Pleban, Vaughn et al., 2011) with mixed success. Tucker et al. found this approach yielded the highest self-report of training effectiveness and was more engaging for students. Students also rated this approach highest with regard to adequacy of coverage of course topics. Pleban, Vaughn et al. found this approach to be ineffective in training mission planning skills. A weakness of the invention/contrasting cases framework was the high cognitive loads placed on the students. Also, the brevity of the training allotted in these investigations (one day for Pleban, Vaughn et al. and two days for Tucker et al.) may have played a major role in explaining the lack of improvement from the students on the objective performance measures.

Pleban, Graves et al. (2011) found the contrasting cases/invention approach to be effective in training ethical decision-making skills but the training involved repeated cycles of invention/contrasting cases over a period of sixteen weeks. Although total training duration may be problematical, there are a few advantages of this approach for use in a military classroom training environment. The module design can readily fit established/conventional (50-60 minutes) time blocks and not negatively impact course throughput. Another advantage of the invention-contrasting cases approach is of its partial reliance on lectures. Military course

instructors would be more comfortable with this approach versus serving exclusively as a PCI facilitator.

Framework for Costing Instructional Methodologies

As indicated above, the decision to change from one instructional methodology to another is based not only on the relative training effectiveness of the methodologies, but also on the resources required (1) to change from one to another and (2) to subsequently maintain the replacement methodology. The universe of training resources is large, and includes both tangible items, such as troop transport vehicles, and intangible items, such as instructor personal characteristics.

Given the number and diversity of resources that must be considered for costing Army training, there is a need to adopt a comprehensive model or framework that can be used to methodically suggest and categorize candidate methodologies. The framework should be such that it accounts for impact on resources within the instructional course, on resources that directly support the course, and on resources that indirectly support the course. It also should take into account the impact of the methodology on the student as well as the overall training system.

The framework selected was a modification of the Federal Enterprise Architecture Performance Reference Model or PRM (U.S. Office of Management and Budget, 2007). PRM is designed to identify relationships between resource inputs, outputs and desired outcomes. A modified, high level depiction of the framework is provided in Figure 1.

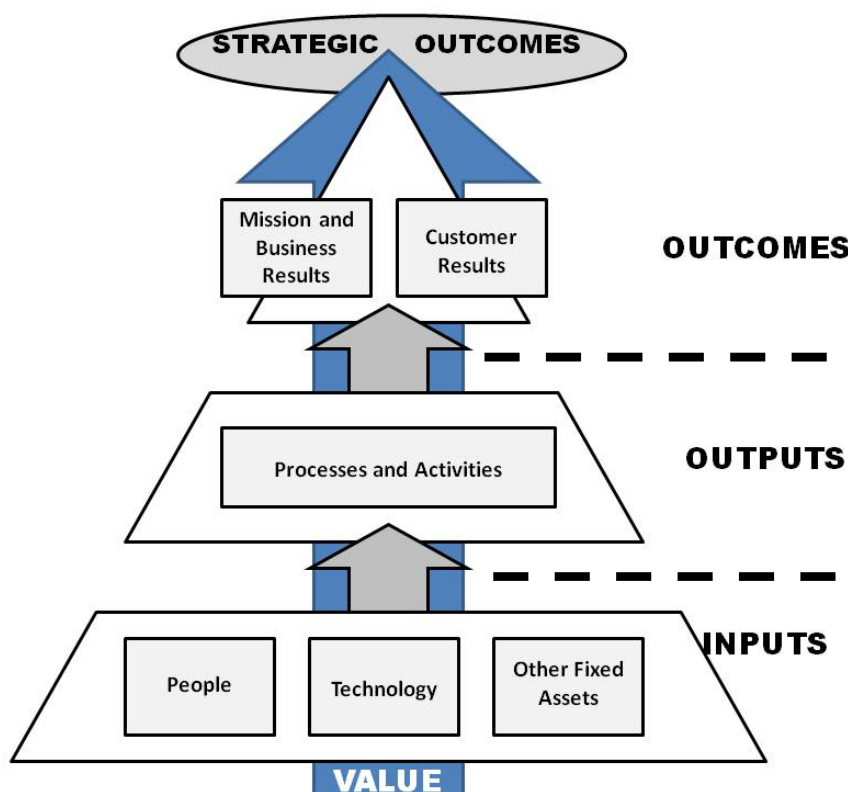


Figure 1. Performance Reference Model (U.S. Office of Management and Budget, 2007).

This effort used the PRM framework as a guide to ensure all of the stakeholder areas were considered. The primary stakeholders in this case were not just the Noncommissioned Officer Academy (NCOA) and Noncommissioned Officer (NCO) students, but also the units who will receive the NCOA graduates and the Soldiers that the NCOs will lead and evaluate. Terminology from the PRM was adjusted to accommodate Army terminology as was the process, with the recognition that Army training is not conducted in accordance with a standard business model (e.g., in most cases, the primary customer of Army training is required to participate and resources are constrained by levels well-above the actual implementers).

In the remainder of this report, the PRM *inputs* are treated in the Methods section, the *outputs* are treated in the Results section, and the *outcomes* are treated in the Results and Discussion sections.

Research Objectives

The objectives of the present research were to expand on earlier research by examining the training value/impact of the contrasting cases/invention strategy in a typical Army institutional classroom setting as well as investigating the differential effectiveness of DI and PCI approaches for training different types of tasks, i.e., procedural/factual tasks with a well-defined correct solution versus ill-structured tasks with no clear cut solution.

Given the research was also motivated by considerations of implementing ALM, there were two additional objectives. The first of these was to situate the work in a venue realistic to Army institutional training. That is, an effort was made to identify an existing course of instruction and to incorporate an existing block of training into the research. And, within that course of instruction, students normally enrolled in the course were to be used as experimental subjects. An interaction was predicted with students receiving a DI module performing better on tasks requiring the recall of facts/declarative knowledge than those receiving a prototype PCI module and with students receiving the PCI module performing better on the more ill-structured tasks than students receiving the DI module.

The second of these objectives was to begin to identify and characterize the institutional cost factors that should be taken into account in making decisions to implement PCI for existing training. Given that a PCI approach for specific training may result in more effective or efficient training, before a decision is made to convert to PCI, there must be evidence that the gains due to PCI are not negated by a concomitant increase in cost to train.

Method

Training Effectiveness

Design Overview. The course of instruction selected was Military Occupational Specialty (MOS) 11B Phase 2 Advanced Leaders Course (ALC). 11B ALC is conducted by the Henry Caro NCO Academy (NCOA) at the Maneuver Center of Excellence, Fort Benning, GA. The instructional cadre are 11B Staff Sergeants (SSGs) and Sergeants First Class (SFCs). 11B

ALC students are mostly SSGs, along with some senior Sergeants (SGTs). 11B ALC course of instruction consists of multiple 4-hour blocks of instruction in topics that are critical to an 11B SSG's duties. A block of instruction may be delivered by en masse lecture to up to 160 students or, in most cases, to small 16-person groups.

The topic selected was preparation of noncommissioned officer evaluation reports (NCOER). The NCOER is an annual evaluation addressing the NCO's performance and suitability for increase in responsibilities and in rank. In a typical unit, subordinates' NCOERs are prepared by SSGs (raters) based on the raters' assessment of their subordinates during the period being reported. The two forms associated with NCOER preparation, the "NCOER Counseling and Support Form" and "NCO Evaluation Report," are shown in Appendix A.

While there are many well-defined, procedural components involved in writing a good NCOER, there are additional ill-defined requirements involved as well in writing narrative "bullet" statements to support the ratings on various NCO tasks, leadership dimensions and Army values. Thus, the topic of NCOER preparation was selected based on its being composed of both well-defined and ill-defined tasks.

The 11B ALC's then current version of NCOER preparation instruction was conducted in a DI 4-hour mass lecture format, with upwards of 160 students in the class. The lecture comprised minimal student active participation and neither formative nor summative assessment. In the research team's opinion, this was a relatively inefficient application of DI, and a comparison of the effectiveness of the lecture version with a PCI version would likely trivially and uninformatively favor PCI. Therefore, as part of the design, an experimental DI version of the block of instruction was constructed, drawing on the pre-ALM Army guidelines for developing training (U.S. Army, 1999). The design consideration was that the PCI and the DI instances should be based on the best practices for both frameworks. Content and process of the two experimental instances are outlined below.

A mixed factor design was employed, with DI and PCI experimental conditions and a control condition. The experimental conditions comprised six 11B ALC small groups (approximately sixteen students per small group) randomly assigned to the experimental conditions, two groups to receive the DI, two the PCI training module, and two the then current lecture module. Students in both the DI and PCI training conditions completed an NCOER pretest, participated in the instruction, and then completed an NCOER posttest. Students in the control condition received the NCOER posttest only.

Experimental participants. Participants in the DI and PCI conditions were 67 NCOs attending 11B ALC.

Tables 1-3 summarize demographic and educational information of the ALC students who took part in this research. The items in Table 3 refer to items on the "NCO Evaluation Report" form in Appendix A. The data of several participants were screened out for being incomplete and/or otherwise indicating careless responding (i.e., invariant data, respondents circling entire columns of responses, etc.; see Dollinger & DiLalla, 1996). After this screening process, the sample consisted of 61 participants.

Table 1. Summary Demographic Information for the Infantry ALC Students

	SGT (n = 18)		SSG (n = 40)	
Mean Time in Service (months)	75		94	
Mean Time in Grade (months)	28		20	
Civilian Education:				
GED	1	6 %	4	10 %
HS Diploma	10	56 %	13	33 %
Some College	7	39 %	18	45 %
Associate or Bachelor Degree	0	0 %	5	13 %

Table 2. Relevant NCOER Education/Experience Reported by Infantry ALC Students
NCOER Relevant Education/Experience (%)

Received Recognition for Writing	15
Taken College Level Writing Course	25
Regularly Conduct Quarterly Counseling	83
Regularly Use the NCOER Support Form	43

Note: n = 60

Table 3. Relevant NCOER Experience Reported by Infantry ALC Students: I

NCOER Relevant Experience (%)	Me	Platoon Sgt	Co Cmdr	Above/ Unk
Who Completed the Administrative Sections (Parts I & II)?	63	33	0	4
Who Developed Bullet Comments (Part IV)?	71	25	0	4
Who Determined the Ratings?	44	43	6	7

Note: n = 54

Table 4. Relevant NCOER Experience Reported by Infantry ALC Students: II

NCOER Relevant Experience (%)	1	2-3	4-5	5+
How many NCOERs have you been a rater for? (n = 45)	35.6	42.2	11.1	11.1
How many NCOERs have you received? (n = 59)	10.2	59.3	16.9	13.6

Control participants. The control group consisted of 30 ALC students. All had previously, as part of the ALC POI, received the then-current 4-hour block of instruction covering principles of Army writing and preparation of NCOERs.

Instructors. The same instructor conducted both the DI and the PCI classes. A member of the research team, this instructor was a trained, qualified educator, with experience in both DI and PCI methods. The DI/PCI instructor is also considered a subject matter expert (SME) in the area of NCOER preparation. A different SME instructor not associated with the research team conducted training for the control group as part of the normal 11B ALC cadre.

Instruments. The experimental groups were administered a demographic questionnaire and pretest prior to instruction, and a posttest and post training questionnaire subsequent to instruction. The control group was administered the posttest only.

Demographic Questionnaire. The Demographic Questionnaire consisted of 11 items presented in multiple choice or short answer formats. The first 10 items addressed students' general background and their experience in preparing NCOERs. The eleventh item was a one-sentence writing sample. The entire questionnaire is at Appendix B.

Pretest. The Pretest consisted of 17 items presented in multiple-choice or short-answer formats. Pretest (and posttest) content was validated by a panel of subject matter experts consisting of a senior active duty trainer, a retired Sergeant First Class (SFC) and two retired First Sergeants (1SG), all with broad experience in operational unit leadership positions. The context of the pretest involved having the students role play a squad leader faced with completing an NCOER for a fictitious Soldier in their squad. Students were provided with a partially completed NCO Evaluation Report (DA Form 2166-8), a partially completed NCOER Counseling and Support Form (DA Form 2166-8-1), three Developmental Counseling Forms (DA Form 4856) and the fictitious Soldier's file containing miscellaneous orders, records, and notes. In addition, they were provided with supplementary NCOER reference material (AR 623-3 and DA Pam 623-3 to help them answer selected questions on the pretest.) The Pretest (shown in Appendix C) consisted of three sections:

- Rules and Principles for Writing NCOER Bullets (6 items)
- NCOER Knowledge and Bullet Writing (8 items based on the fictitious Soldier)
- Rules and Principles of the NCOER Evaluation Reporting System (3 items)

Posttest. The Posttest consisted of 15 items presented in multiple choice or short answer formats. The Posttest was structured in a similar fashion to the Pretest but the scenario based materials involved a different (fictitious) Soldier. See Appendix D for the items.

Post Training Questionnaire. The Post Training Questionnaire consisted of 21 items presented in Likert-type or short answer format. The questionnaire consisted of two sections addressing Soldiers' perceived level of understanding of the NCOER process before and after instruction and their attitudes toward the effectiveness of the instruction. See Appendix E for the items.

Procedure. The overall sequence of events for addressing training effectiveness is given in Figure 2 below. Details of the figure appear above and in the sections following the figure.

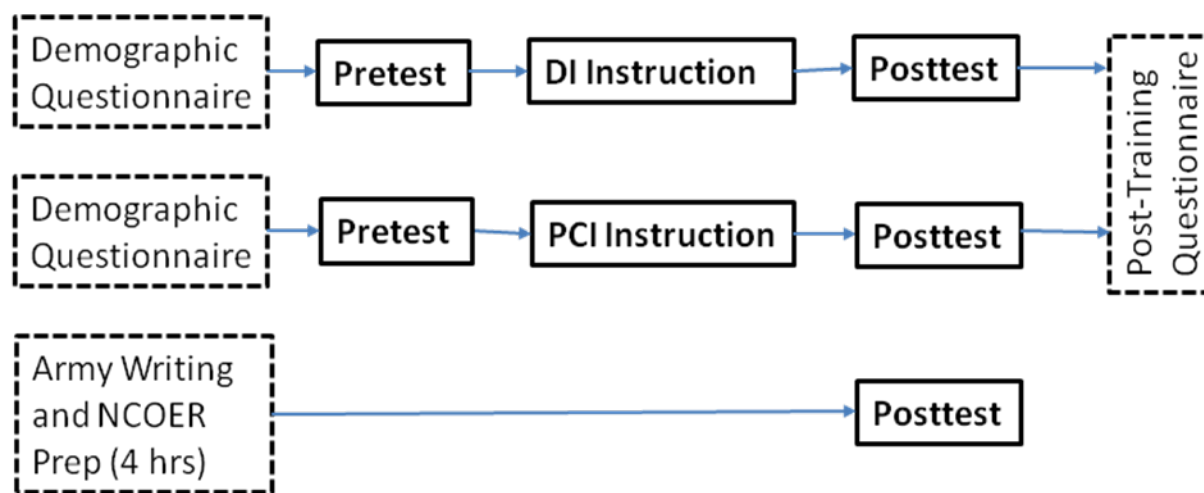


Figure 2. Design of training effectiveness assessment.

Experimental condition: PCI. Students arrived at one of the ALC small group classrooms as one group (approximately 16 students per group). The students were first briefed on the purpose of the experiment (i.e., to prepare the rater's portion of an NCOER with a specific focus on writing bullets and making accurate ratings). They then completed the pretest and the Demographic Questionnaire.

Next, the class was divided into two-man teams. As part of an instructional scenario that they were taking over the position of a fictional squad leader who had just been transferred, each team was provided with forms/information prepared by the former squad leader for two fictitious Soldiers, i.e., NCO Evaluation Reports (DA Form 2166-8), partially completed NCOER Counseling and Support Forms (DA Form 2166-8-1), initial counseling, Developmental Counseling Forms (DA Form 4856) and the Soldiers' files with miscellaneous orders, records, and notes. The student teams read through the folders and contrasted profiles of the two fictitious Soldiers to help gauge their understanding of the Soldiers' performance and to assess

the former squad leader's ability to write good bullets and provide accurate assessments, counseling and follow-up feedback.

The instructor then facilitated a group discussion on the evaluations of the two fictitious Soldiers and the former squad leader's efforts at preparing NCOERs. Following the discussion, the teams then wrote bullets on specific values, attributes, skills, and actions (on acetate sheets) listed in Parts IV and V of the NCO Evaluation Report. Each team addressed a different category, e.g., Army values – honor, integrity; NCO responsibilities – competence, physical fitness, leadership, training responsibility and overall performance and potential. Bullet writing addressed the invention phase of the PCI module.

After each team had written its bullet for an assigned value or NCO responsibility, the instructor collected each acetate sheet from the teams and displayed them (separately) on an overhead projector. The class reviewed each bullet and provided feedback. The instructor guided the discussion. After all bullets had been presented, the instructor then provided a brief review (lecture) to reinforce key teaching points.

This process was repeated two more times. The major difference between each of the three iterations was that the profiles presented for each practical exercise were each designed to highlight different instructional objectives, e.g., how to write negative bullets. In summary, the instructional cycle captured, conceptually, the essence of contrasting cases/invention, i.e., comparison of multiple examples (differing profiles), invention (writing bullets), followed by small group discussion, feedback, and follow-on lecture highlighting key points in each practical exercise. Following the last exercise and lecture, the PCI students completed the posttest, and the Post Training Questionnaire.

Experimental condition: DI. Students arrived at one of the ALC small group classrooms and were briefed on the general research objectives. They then completed the pretest and Demographic Questionnaire.

The class was then divided into two-man teams. The instructor first addressed the importance of having an evaluation system and the role of the rater. He then provided a 45 minute lecture in which he reviewed the different parts of the NCOER and gave guidelines for Parts I-III (administrative data, authentication, duty description, respectively), Part IV – Army values and emphasized the critical values for the subordinates (honor and integrity). He then provided rules for constructing bullet comments. Finally, he discussed the specific sections listed under Part IV (i.e., competence, leadership, training, responsibility and accountability).

Following the lecture, the instructor distributed NCOER materials used in the PCI module with the major difference being that student teams received information on only one fictitious Soldier at a time. Student teams read through the materials and then wrote bullets for this fictitious Soldier on specific Army values, attributes, skills, and actions on acetate sheets. As with the PCI module, the instructor collected the sheets and displayed each sheet on an overhead projector for the whole class to view. The class provided feedback on how the bullets could be improved. The instructor provided additional feedback, led the small group discussion, and then re-emphasized key teaching points. This process was repeated two more times. Each

practical exercise was different and designed to provide examples supporting specific instructional objectives. In summary, the design of the DI module differed from the PCI module by starting with an extensive lecture followed by three practical exercises. These exercises were less complicated than the PCI exercises since each involved only one fictitious Soldier profile. Feedback and small group discussion followed each exercise. Following the last exercise, the DI students completed the posttest and the Post Training Questionnaire.

Control condition. Students in the control condition had previously completed the then-current 11B ALC 4-hour module covering NCOER preparation and Army writing. They assembled at one of the ALC small group classrooms and were briefed on the general research objectives. They then completed the same posttest that was administered to the DI and PCI students.

Training Efficiency

For purposes of this project, “efficiency” refers to the cost of a training alternative that satisfies the terminal objectives of a block of instruction. Objective measures of efficiency (MOEs) were developed for each of the cost factors identified through the PRM.

Three distinct courses of action (COA) were assessed using the MOEs. The base situation consisted of the current block of training used by the NCOA. This included the materials (produced by the NCOA) used by a single instructor, mainly lecturing to the entire class of students. The second situation incorporated instructional materials developed for presentation by small group leaders using the DI approach. The third situation was similar to the second, but was designed and structured for presentation using the invention/contrasting cases instructional (PCI) approach.

People MOEs. The People MOEs refer to human capital requirements. Broadly, a COA is more efficient to the extent it requires fewer personnel to implement.

Instructor-student ratio. In general, given the costs associated with maintaining instructional personnel, a lower instructor-to-student ratio is preferred.

Recruiting and training instructors. In general, a COA is more efficient to the extent it minimizes the costs of identifying and preparing instructors. There are tradeoffs to be considered within this MOE: in some circumstances, it may be possible to identify and engage more experienced instructors who may need less training in either instructional methods or subject domain than would less experienced instructors.

Technology MOEs. These can include many aspects that support a given program such as applications, infrastructure, or other services. This analysis highlighted the differences among the COA based on two factors: training site and training aids.

Number and size of classrooms. To the extent that they involve dividing a course into a few large classes or into several smaller class sizes, COA may differ in resourcing requirements. In general, as number of classrooms increases, the classroom common infrastructure costs

(display capability, instructor support items, etc) also increase. If the COA also involves construction of new training facilities, the life cycle cost differential between large and small classrooms must also be considered.

Training aids. In the context of this work, training aids include training material and technology above and beyond the classroom common infrastructure. Examples are typically media related, such as audiovisual equipment.

Other Fixed Assets MOEs. These include any other physical resource used in a COA.

Paper handouts and reference materials. COA can vary in physical materials, such as handouts and reference material, required to conduct training. Some of these materials may be re-used from class to class and replaced only periodically, while others may be provided to the students as “take away” material and must be replaced for each class.

Development of appropriate instructional materials. There is a one-time expenditure of time and material to develop training matter for a module, and there is a smaller, but important, continuing expenditure to maintain that training matter. There is also the possibility that developing training matter for a COA may require specialized (and more expensive) expertise for the training developer.

Time to conduct training to standard. In general, the more rapidly a COA will result in Soldiers trained to standard for a task, the more efficient that COA is. In the case of the NCOER preparation training module, 4 hours were already allocated for training. If a COA were to require significantly more or significantly less time for Soldiers to train to standard, then the relative efficiencies would become a greater consideration.

Transportation costs. If a COA involves Soldiers’ using a different, second training venue, then transportation resources may become a factor. These transportation costs include both the monetary cost of movement and the training “dead” time involved while Soldiers are in transit.

Results

Overall Findings

For this research, we measured participants’ performance on well-defined (WD) tasks in terms of their score on the pretest and posttest sections relating to the Rules and Principles for Writing NCOER Bullets and the Rules and Principles of the NCOER Evaluation Reporting System. Items from these sections addressed the participants’ understanding of well-defined rules for the completion of NCOERs and have objectively correct answers. The well-defined task score was based on the percentage of the total points accrued by the participant on these two sections. The maximum possible WD score was 49% on the pretest and 52% on the posttest.

Similarly, we measured participants’ performance on ill-defined (ID) tasks in terms of their score on the pretest and posttest section relating to NCOER knowledge and bullet writing.

These items required the participant to review a fictitious Soldier's performance record and identify a bullet that accurately and effectively reflected that performance. The rest of the ill-defined task items were in a short answer format in which the participant is asked to produce a novel bullet based on the fictitious Soldier's performance. These items were subjectively rated on three attributes: Beginning, Concise, and Substantive (see Table 5). The ill-defined task score was based on the percentage of the total points accrued by the participant on this section. The maximum possible ID score was 51% on the pretest and 48% on the posttest.

Table 5. Scoring Rubric for Ill-defined Task Items Using the Short Answer Format

Attribute	Max. Points	Description
Beginning	2	Bullet starts with or contains a verb in past tense to address performance or contributions, or begins with a personal pronoun. The bullet is in active voice
Concise	2	Bullet is concise, short and to the point; not longer than two lines (approximately 185 characters and spaces in Part I.V.a. and approximately 165 characters/spaces for Part IV. b.-f.
Substantive	3	Bullet provides a quantitative or comparative, substantiated comment on the rated NCO's performance, results, achievements, deficiencies, or shortcomings supporting the ARMY VALUES or VALUES/NCO RESPONSIBILITIES rating.

Figure 3 illustrates the overall effectiveness measurements for the DI and PCI students. To evaluate participant learning as affected by learning condition, a three-way (2x2x2) mixed factor analysis of variance (ANOVA) was conducted on task score. The independent variables included one between groups variable, *experimental condition*, with two levels (DI, PCI) and two within subjects variables, *time* and *task definition*, with two levels each (pretest/posttest and well-defined/ill-defined, respectively).

The Box's M test indicated no evidence to suggest that the homogeneity of variance assumption was violated (Box's $M = 12.484$, $F(10,15, 489)=1.153$, $p = 0.318$). There was a significant main effect of time ($F_{1,56}=134.716$, $MSE=0.008$, $p < 0.001$). Overall, the average score on the posttest (75%) was greater than on the pretest (58%) regardless of condition or task definition. Simple main effects analysis demonstrated that the pretest and posttest scores were significantly different for both the well-defined ($F_{1,56}=79.695$, $MSE=0.001$, $p<0.001$) and ill-defined tasks ($F_{1,56}=110.888$, $MSE=0.012$, $p<0.001$). There were no significant interactions, and, in particular, no interaction between experimental condition and type of task. (Figure 3).

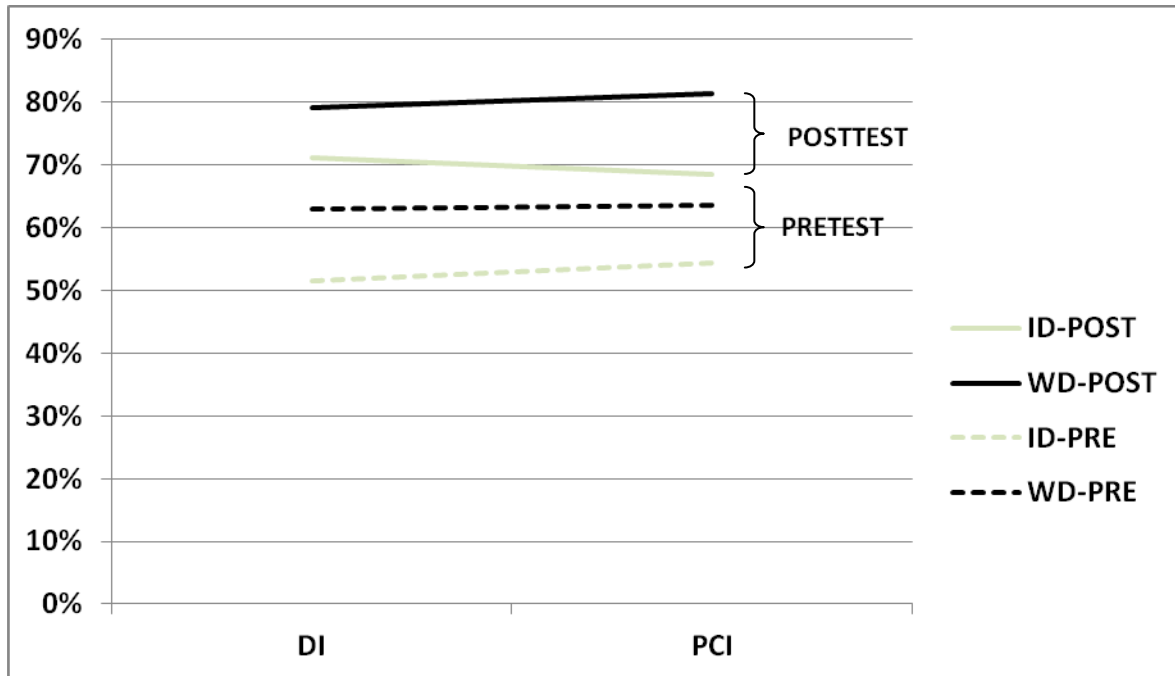


Figure 3. DI and PCI students showing overall difference between pretest/posttest and between ID/WD

Considering previous experience as a rater in preparing NCOERs (cf. Table 4) to be an indicant of expertise, correlations between posttest scores and number of NCOERs rated for well-defined and for ill-defined items for DI students and PCI students were all calculated. None of the four correlations were significant.

To determine how well the two experimental training modules fared relative to the control group, a two-way (2x3) mixed factor ANOVA was conducted on posttest task score. The independent variables included one between groups variable, *condition*, with three levels (DI, PCI, and Control) and one within subjects variable, *task definition*, with two levels (well-defined and ill-defined). There was a significant main effect of condition ($F_{2,84}=5.558$, $MSE=0.020$, $p<0.005$). Additionally, there was a significant interaction between task definition and condition ($F_{2,84}=13.751$, $MSE=0.012$, $p<0.001$). Simple main effects analysis demonstrated that the posttest scores for the well-defined tasks did not differ significantly ($F_{2,84}=0.169$, $MSE=0.020$, $p=0.845$), but the posttest scores for ill-defined tasks were significantly different ($F_{2,86}=23.438$, $MSE=0.012$, $p<0.001$). Post hoc Tukey tests (at $p\leq 0.05$) were conducted to explore this effect and found that on average the posttest score for ill-defined tasks of the control group (62%) was significantly lower than that of participants in either the DI (78%) or PCI (79%) conditions (See Figure 4).

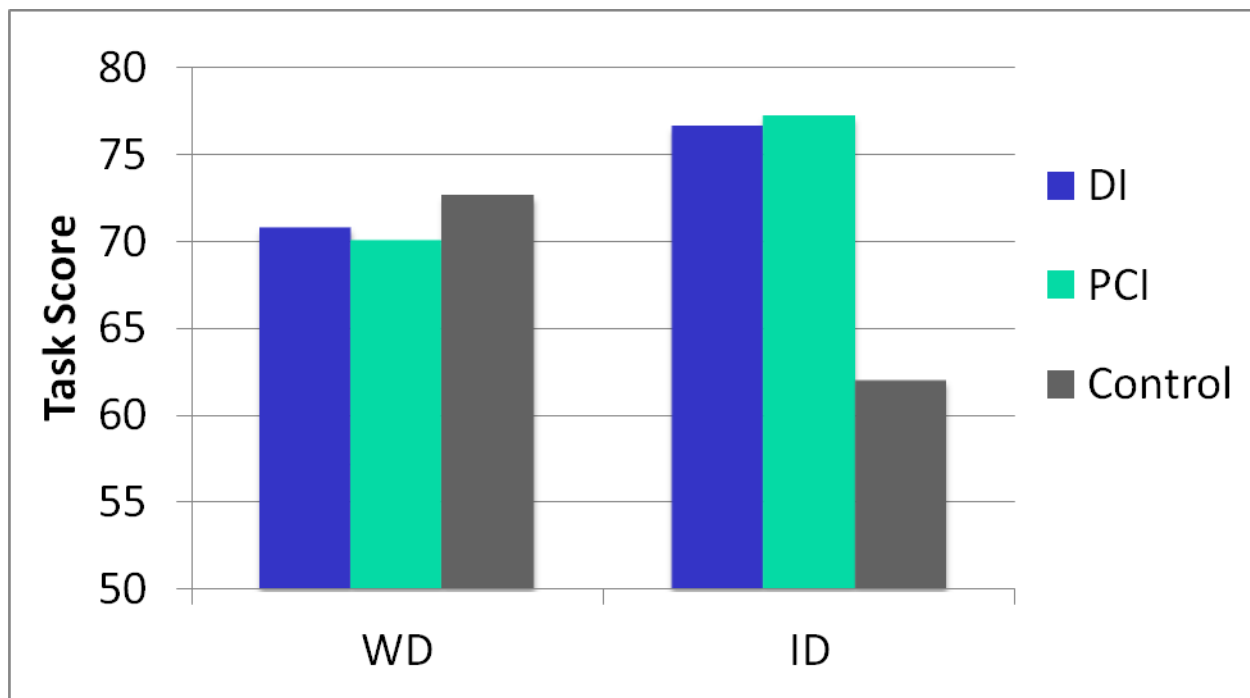


Figure 4. Comparison of the posttest scores for well-defined (WD) and ill-defined (ID) tasks by experimental condition.

Pre/Post Differences in Level of Understanding

The participants were asked to rate on a five point Likert-type scale, ranging from zero (“Do Not Understand”) to 5 (“Could Teach This to Others”), their level of understanding before and after instruction on several activities related to completing NCOER forms: (a) Conducting meaningful counseling and documenting results, (b) using the NCOER support form to fully document performance, (c) including meaningful bullets that accurately document performance, and (d) using supporting documentation when developing ratings and meaningful bullets. A two-way (2x2) mixed multivariate analysis of variance was conducted on the ratings for the activities. The independent variables included one between groups variable, *experimental condition*, with two levels (DI and PCI) and one within subjects variable, *time*, with two levels (pretest and posttest). There was not a significant main effect for condition for any of the activities ($F_{4,52}=0.322, p=0.862$), but there was a significant and interpretable main effect of time ($F_{4,52}=51.100, p<0.001$). Participants in both experimental conditions felt that their understanding increased significantly after instruction for all activities. The results revealed a significant interaction between *time* and *experimental condition* ($F_{4,52}=3.015, p<0.026$). Post hoc univariate ANOVAs for each activity revealed that the interaction effect between time and experimental condition was only significant for “Conducting Meaningful Counseling and Documenting Results” ($F_{1,55}=11.526, MSE=0.363, p<0.001$). Participants in the PCI condition reported a greater increase in their understanding of this activity as a result of the instruction than did the DI condition. This finding is due to the two experimental conditions reporting a

significantly different understanding of this activity prior to instruction ($t_{56}=2.104, p<0.04$; Figure 5).

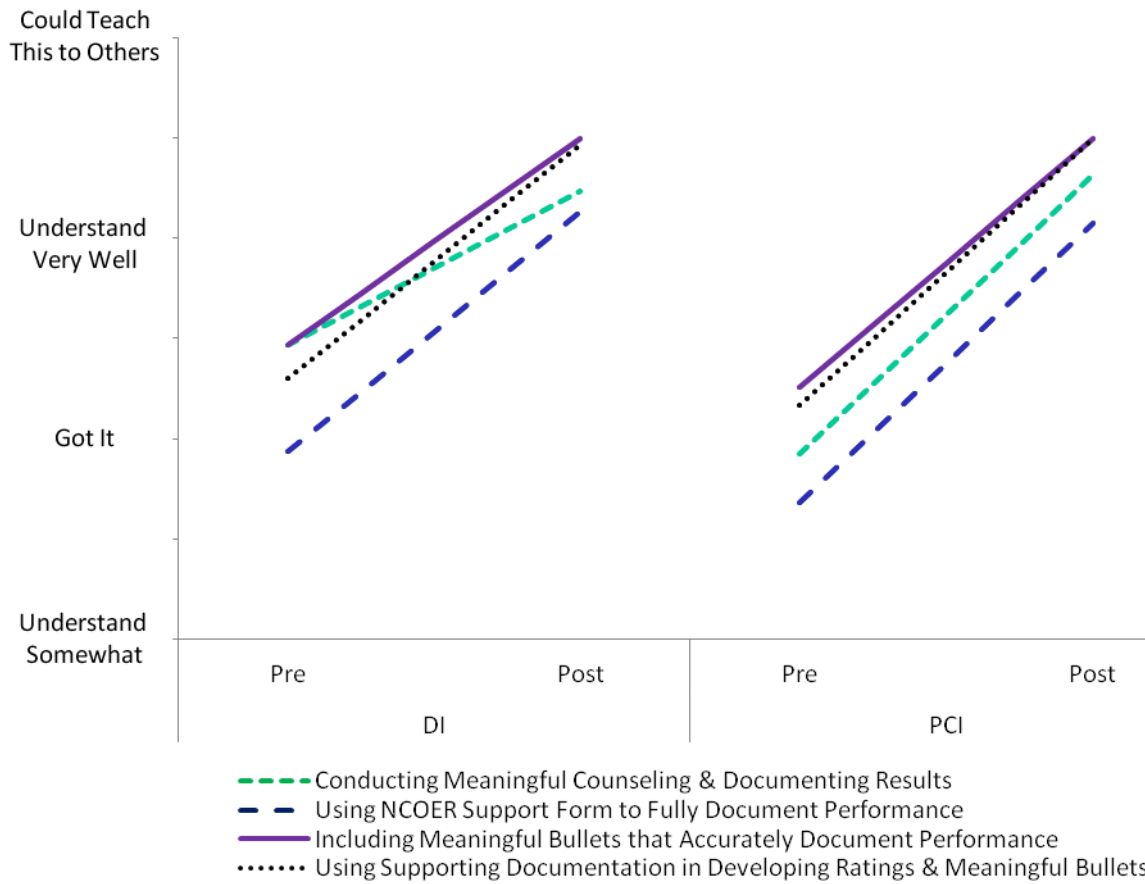


Figure 5. Mean ratings for level of understanding of activities before and after instruction by experimental condition.

Student Perceptions of Training Value

To evaluate the effect that the two instructional methodologies had on the participants' perception of the value of the NCOER preparation instruction, independent groups T-tests were conducted on the eleven posttest questionnaire items addressing students' valuation of the training. The independent variable was the between groups variable, *experimental condition*, with two levels (DI and PCI). Ratings for all categories were higher for PCI than DI with significant differences (all favoring PCI) found for Item 5, $t(54)=2.174, p < .05$; Item 7, $t(55)=2.256, p < .05$; and Item 10, $t(55)=2.491, p < .05$. The items appear in Table 6 and their mean ratings appear in Figure 6.

Table 6. Items Relating to Perceptions of Value of Training

Category – “The instruction...”	
1	Gave me a much better understanding of the NCOER process.
2	Prepared me to perform my duties as a rater.
3	Prepared me to develop more meaningful and accurate NCOERs.
4	The time devoted to explaining concepts was adequate.
5*	Covered issues and nuances in the NCOER process that were very helpful.
6	Provided valuable insights on how to effectively develop appropriate bullets for an NCOER.
7*	Improved my ability to write an NCOER that accurately represents the NCO’s performance.
8	Provided me a better appreciation for accessing and using Army publications.
9	Assisted me in knowing what I need to do to receive an “Excellent” rating.
10*	Has motivated me to ensure my subordinates receive accurate NCOERs.
11	Has motivated me to ensure that my NCOER accurately reflects my performance.

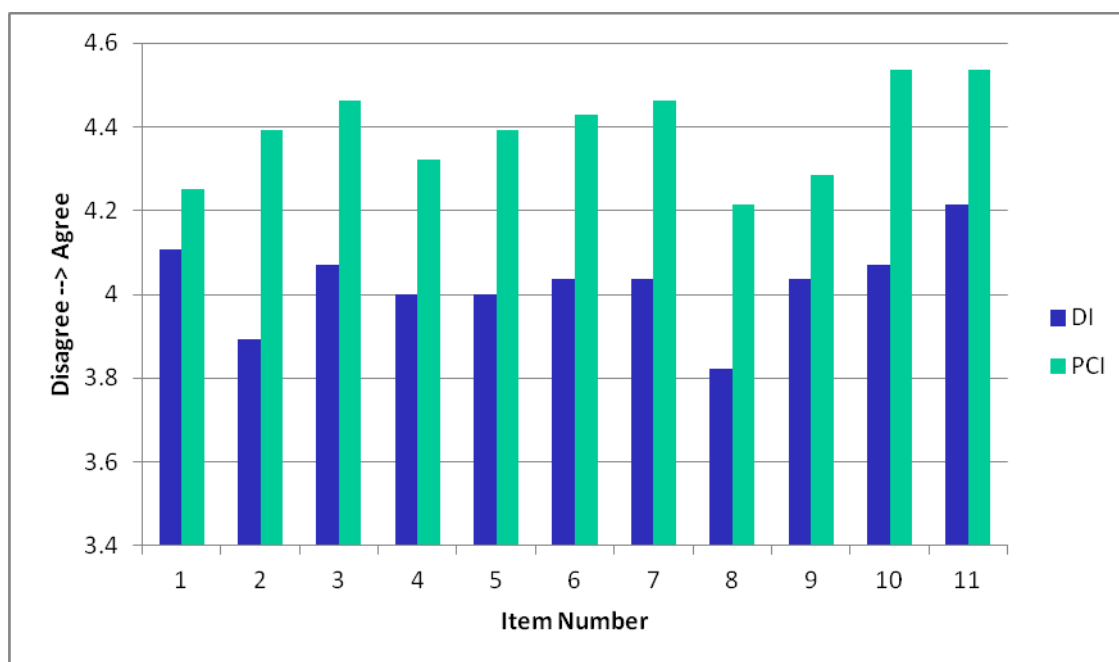


Figure 6. Mean ratings for perception of instructional value by experimental condition and category.

Institutional Resources

For the measures of efficiency listed in Table 7, approximate resources required or expended were recorded. It should be noted that, because the resource requirements were only to be characterized instead of rigorously quantified, the quantities in some cases may range from

approximate to anecdotal. Three distinct courses of action were assessed using the MOEs: the current situation, the DI approach, and the PCI approach. Some historical resource requirements for the current situation, e.g. ratio of preparation hours to instructional hours, were not directly available but were estimated by consensus.

People MOEs. Broadly, the current block of training is relatively more efficient than both the DI and PCI methodologies across the dimensions of People MOEs.

Instructor-student ratio. Currently, one instructor can train up to 160 students simultaneously in a mass lecture format. Both the DI and PCI methodologies require a small-group (i.e., approximately 16 students) approach.

Recruiting and training instructors. The current training can be completed by one person with limited knowledge of the content using Microsoft PowerPoint (PPT) slides to present material. On the other hand, the instructors for DI and PCI require a greater level of class content knowledge. The practical exercises (PEs) require close interaction with students. It is estimated that the instructors will generally take at least two (for DI) to four (for PCI) times as much training and preparation time to administer the class. The PCI methodology, in particular, requires a high level of expertise in the content area and the ability for the instructor to go “off-script” in response to the needs of the class. Replacing and preparing small group instructors (SGIs) with sufficient depth of knowledge to present material and to facilitate the PEs using the PCI approach is much more complicated and demanding than the two other approaches.

Technology MOEs. The Technology MOEs can include many aspects that support a given program such as applications, infrastructure, or other services. This analysis highlighted the differences among the instructional methodologies based on two factors, classrooms and training aids.

Number and size of classrooms. The current training is conducted in a single room, large enough to seat up to 160 students. The DI and PCI training require 10 sixteen-person classrooms.

Training aids. In the current training, a single projection system is required, with sufficient viewing screens properly positioned for all students to see the screens. Presentation is in PPT so a computer device necessary to show the slides is required. Handouts and exercises are extremely limited so desk space for each student is not needed.

In both the DI and PCI training each classroom needs to have a projection system and screens that can be viewed by all students. Some presentation is in Microsoft Powerpoint, so a computer device is required to show the slides. Handouts and exercises are extensive so desk space for each student is required. (*Note:* These capabilities already exist and are used for other ALC classes.)

To properly conduct the DI and PCI training, a method must be available for students to quickly and easily compare their inputs with other students and to facilitate discussion. During pilot sessions this was accomplished using an overhead projector with preformatted acetate

slides. Other alternatives are possible. For example, students could each move to a central computer terminal and enter their input which could then be projected in the classroom. This technique would require additional time while each student enters input before progressing into discussions. Another possibility would require students to have a computer device that could transmit/share input to the central computer terminal (e.g., e-mail, shared-drive). In this approach, each student would prepare input and send it to the central computer terminal for projection. Additionally, the DI and PCI training methods require approximately 50 pages of reference material for each student. These items can be recovered at the end of the class, but would need to be stored for reuse with subsequent classes. Most students wanted to take reference materials with them for future use. If this were allowed, reproduction of references would become a recurring cost and storage space would not be required. If an overhead projector is used to allow student sharing/comparing of input, approximately 24 acetate slides are needed for each SGI. These items are reusable, but would need to be replaced periodically due to wear and tear.

Other Fixed Assets MOEs

Paper handouts and reference materials. The physical materials such as handouts and reference material required to conduct the current training amount to less than 5 pages. The DI training uses approximately 125 pages and 5 manila folders, and the PCI training uses roughly 170 pages and 8 manila folders. For both DI and PCI, about 80% of the materials could be saved and reused for subsequent classes. This would require instructors to ensure students do not mark on papers. Also, instructors would need to recover all materials at the end of class, then sort and check papers/folders to ensure all necessary papers are retained in the correct packets.

Development of appropriate instructional materials. As a general “rule-of-thumb”, on average, it takes about 10 hours to develop one hour of training. This is not documented, but is used by some Army training developers. The materials for the current training are already well established and basically require no preparation prior to the instruction period. For this effort, the DI training required approximately 25 hours to develop each hour of training (a total of 100 hours for the 4-hour NCOER class), in order to cover the material to the desired level of proficiency and provide sufficient challenging PEs. The PCI training required approximately 40 hours to develop each hour of training (a total of 160 hours for the 4-hour NCOER class), in order to cover the material to the desired level of proficiency and provide sufficient contrasting and challenging PEs.

Time to conduct training to standard. The current POI allots 4 hours for the NCOER class. Therefore, the DI and PCI variants were constructed to generally fit within this available time. According to ALC cadre, the current class does not adequately train students to the desired standard. Training to standard could be accomplished within the allotted 4-hour time frame. However, our assessment is that the current training content and presentation style would need to be altered in order to conduct training to standard. Based on pilot training sessions, material for the DI condition was presented within the allotted 4-hours, including completion of the post-test. The proper and adequate presentation of the PCI material, which includes sufficient time to appropriately conduct the variety of contrasting cases, would take about 5-hours, including completion of the post-test.

Transportation costs. When the research was performed, all students had to be transported to or provide their own transportation to move from the SGI classrooms to a separate facility that seated the entire class (up to 160 students). The movement time also added approximately one hour to the training time, including student movement from SGI rooms to transport location, transport to alternate site, movement into large facility, and the reverse process for returning to the SGI classrooms. Currently, the SGI classrooms and the lecture facility are located within the same building complex. With the current building complex, there are no significant transportation differences across the three courses of action.

Institutional resources required for this specific block of instruction are summarized in Table 7.

Table 7. Assessment of Measures of Efficiency for Each Instructional Methodology

Measure	Current	DI	PCI
People MOEs			
Instructor Student Ratio	1:160	1:16	1:16
Recruiting & Training Instructors	Easy	Difficult	More difficult
Technology MOEs			
No. of classrooms	1 large	10 small	10 small
Training Aids	Projection capability	About 50 pages of material, projection capability	About 50 pages of material, projection capability
Other Fixed Asset MOEs			
Handouts and Reference Materials per Student	About 5 pages	About 125 pages	About 170 pages
Instructional Materials Development (prep hrs:instructional hrs)	10:1	25:1	40:1
Time to Conduct Training to Standard	4 hr	4 hr	5 hr
Transportation Costs	Negligible	Negligible	Negligible

Discussion

Overview

ALC 2015 recommends a shift towards more learner-centered, experiential instructional methodologies under the overarching assumption that in many cases this shift will result in more effective training. This research sought to examine the effects of such a shift for a typical Army training module. The research was situated in a typical on-going Army institutional training environment, utilized typical Army students, and employed typical Army assessments of learning. Thus it was expected that any statistically significant results would likely also be operationally significant, and, more importantly, that statistically non-significant results would have no operational significance to the Army. Also, given that the research was situated in a

typical Army training environment, categories of training resource elements would likely be similar to those to be found in typical Army training.

The research evaluated the relative effectiveness of a PCI module to that of a DI module and the training the students currently receive in ALC. Previous studies suggest that PCI should be better suited to training abstract and ill-defined tasks and DI should be a more effective methodology for well-defined, procedural tasks. Both the PCI and DI modules were found to significantly improve student scores on tasks related to NCOER completion from pretest to posttest. The results did not support our hypotheses of differential effectiveness of the PCI instructional methodology compared to DI for the more ill-defined NCOER completion tasks. Despite similar performance on the measures, there were significant differences in the students' perceptions of their training.

The absence of the anticipated significant interaction between instructional approach and instructional domain has two alternative implications: (1) there is no significant differential effect of instructional approach or (2) there actually is a significant effect, but the present research failed to detect it. These two alternatives, along with considerations of required training resources, are discussed in some detail below.

No Difference between DI and PCI Approaches?

There has been a widespread caution (cf. Kirschner, Sweller & Clark, 2006; Mayer, 2004) that PCI approaches are at best no more effective than are DI approaches. More recently, Benson (2012) concludes that there is no compelling empirical evidence to support mandating PCI as a superior pedagogy, but on a positive note concludes that, since it appears to be equivalent to DI, PCI might be adopted for reasons other than training effectiveness. Onyon (2012) also concludes that compelling evidence for adoption of PCI remains undetermined and further suggests that more effort be made to explore implications of some of the theoretical underpinnings of PCI.

The result of this particular research is certainly congruent with previous findings of indeterminate differences. The equal end-of-course performances of the DI and the PCI classes would indicate no operationally significant difference between these two instantiations of the approaches. The inference could be made that, if instruction has been well crafted, either as per DI principles or as per PCI principles, the result will be effective, at least as typically assessed by the Army.

A Real, but Undetected Difference?

On the other hand, there remains the possibility that there was some difference in learning, but that the difference was not captured by this research. Indications that the two instructional approaches were at some level not completely equivalent come from differences in the DI and PCI students' perceived understanding of the subject domain and their perceived value of the training.

Students in the PCI condition rated their prior understanding of the importance of conducting counseling and documenting the results significantly lower than did the DI students.

Because their ratings for prior and current understanding were both evaluated after the training module, it is possible that the PCI students gained a different appreciation of their initial lack of knowledge.

Student perceptions of the training module's value were more positive in the PCI condition. It is possible that the students in the PCI condition viewed the instruction more favorably for several reasons. Increased PCI workload on exercises relative to DI may have influenced PCI students' perceptions. The greater cognitive demands placed on PCI students may have led students to believe that more work/effort expended in training produced better understanding of material and higher levels of perceived performance or competency.

There is the possibility that the primary dependent measures themselves used in this research somehow are insensitive to real differences between the two instructional models. For example, additional alternative or complementary measures, such as response latency, response confidence, etc. might be sensitive enough to detect significant differences between DI and PCI approaches.

Additionally, there is the possibility that PCI-instructed students might out-perform DI-instructed students on a subsequent far transfer task, such as the fairly common Army administrative task of drafting citations for personal awards. Schwartz and Martin (2004) found such an advantage for contrasting cases/invention. However, in later work Schwartz, Chase, Oppizzo, and Chin (2011) examined the effectiveness of contrasting cases when some students are presented the to-be-learned concepts prior to being presented the contrasting cases and others presented the concepts after being presented the contrasting cases. Schwartz et al. found that, although both groups of students performed approximately equivalently on the to-be-learned task, students who were presented the to-be-learned concepts after the contrasting cases performed better on a related far transfer task. Schwartz et al. conclude that, when students experience the initial "inventing" of the to-be-learned concepts before being formally presented the concepts, the underlying deep structures are better learned and, consequently, far transfer is made easier. In the present research, given that 70% of the students had already participated in preparing NCOER bullets (cf. Table 3) and, thus, presumably had some concept of the NCOER preparation task, and given that they had completed the pretest, it is unlikely that the PCI group experienced any appreciable "inventing" during instruction.

The likelihood that students' prior experience or expertise with preparing NCOERs significantly affected their learning was not supported. The lack of significant correlation between the number of NCOERs students had previously prepared and their performance on the posttest would indicate that previous experience had no appreciable effect on terminal learning level.

The foregoing considerations suggest areas for further research into the effectiveness of PCI methods. However, for purposes of the present research, the fact remains: for typical Army students in a typical Army environment using typical Army training assessment measures, there was no operationally significant difference found between the two approaches.

Can Required Resources Make a Difference?

With regards to training effectiveness, the then current NCOER preparation training was less effective than either the DI or the PCI training, and DI and PCI were equivalently effective. With regards to training resources, this finding sets up two comparisons among the training methods: (a) current method vs. DI/PCI and (b) DI vs. PCI.

Current method vs. DI/PCI. Although the then current method was found less effective than DI/PCI, there is the possibility that DI/PCI would be, relative to the current method, much too resource intensive to warrant developing and sustaining a new method of instruction. A cursory inspection of Table 7 reveals that, of the three, the then current method is least resource intensive. This then raises the practical question for training developers: is the gain in effectiveness attributable to the DI/PCI methods (cf. Figure 2) worth the additional resources required to implement the DI/PCI methods? In particular, is the additional skill at ill-defined aspects of preparing NCOERs worth the additional resources? A quantitatively supported answer to these questions is outside the scope of the present effort, but these are examples of issues that may arise and the data that may be required to address them when training effectiveness is traded off against training efficiency.

DI vs. PCI. If the gain in effectiveness due to the DI/PCI methods outweighs the additional resources required to implement them, then the question arises as to whether there are requirements differences of a magnitude to recommend one method over the other. As was anticipated, the PCI method required more resources in instructor training and materials development than did the DI method (cf. Table 7). However, there was no off-setting increase in effectiveness associated with the PCI method. Thus, unless the students' increase in perceived understanding and increase in perceived value more than offsets the resource differential, in a decision to adopt either the DI or the PCI method, the training developer would choose the DI method.

Conclusions

The results of this research support the cautions (e.g., Kirschner et al., 2006; Mayer, 2004) that have been raised concerning indiscriminant application of PCI methods. Although the ALM prescribes that the Army embrace “context-based, collaborative, problem-centered instruction,” these results indicate that, in at least some cases, there may be no benefit of problem-centered instruction over direct instruction. This research indicates that it is possible using best practices within a typical Army institutional training environment to design both PCI and DI that are equivalent in their training effectiveness, as typically measured in that institutional environment. Additionally, the research shows the equivalency can hold regardless of whether the subject domain is well-defined or ill-defined.

However, just as PCI should not be indiscriminately applied, so should the results of this research not be indiscriminately applied to all training. The results by no means indicate that well executed DI and PCI are equivalent – the results should be interpreted as a caution for training developers that in many cases any relative effectiveness advantage to either method may not be operationally relevant.

This research also involved a high-level examination of the relative costs of DI and PCI in terms of required resources. The results indicated, as anticipated, PCI to require more resources for development and for sustainment. This resource differential will likely hold across any Army comparison of DI and PCI, and training developers should take into consideration the difference in resource requirements when making any decision between implementing DI or PCI.

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Appendix A
NCOER Forms

- 1. NCO Evaluation Report**
- 2. NCOER Counseling and Support Form**

NCO EVALUATION REPORT										SEE PRIVACY ACT STATEMENT IN AR 623-205, APPENDIX C					
For Use of this form, see AR 623-205; the proponent agency is ODCSPER															
PART I - ADMINISTRATIVE DATA															
a. NAME (Last, First, Middle Initial)					b. SSN			c. RANK		d. DATE OF RANK		e. PMOSC			
f. UNIT, ORG., STATION, ZIP CODE OR APO, MAJOR COMMAND										g. REASON FOR SUBMISSION					
h. PERIOD COVERED				i. RATED MONTHS	j. NON-RATED CODES	k. NO OF ENCL	l. RATED NCO COPY Check one and Date				m. PSC Initials		n. CMD CODE	o. PSB CODE	
FROM		THRU						1. Given to NCO		Date				OT	
YYYY		MM		YYYY		MM									
PART II - AUTHENTICATION															
a. NAME OF RATER (Last, First, Middle Initial)					SSN			SIGNATURE							
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT												DATE			
b. NAME OF SENIOR RATER (Last, First, Middle Initial)					SSN			SIGNATURE							
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT												DATE			
c. RATED NCO: I understand my signature does not constitute agreement or disagreement with the evaluations of the rater and senior rater. I further understand my signature verifies that the administrative data in Part I, the rating officials in Part II, the duty description to include the counseling dates in Part III, and the APFT and height/weight entries in Part IVc are correct. I have seen the report completed through Part V, except Parts IId and IIe. I am aware of the appeals process of AR 623-205.								SIGNATURE				DATE			
d. NAME OF REVIEWER (Last, First, Middle Initial)					SSN			SIGNATURE							
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT												DATE			
e. <input type="checkbox"/> CONCUR WITH RATER AND SENIOR RATER EVALUATIONS <input type="checkbox"/> NONCONCUR WITH RATER AND/OR SENIOR RATER EVAL (See attached comments)															
PART III - DUTY DESCRIPTION (Rater)															
a. PRINCIPAL DUTY TITLE								b. DUTY MOSC							
c. DAILY DUTIES AND SCOPE (To include, as appropriate, people, equipment, facilities and dollars)															
d. AREAS OF SPECIAL EMPHASIS															
e. APPOINTED DUTIES															
f. COUNSELING DATES					INITIAL			LATER		LATER		LATER			
PART IV - ARMY VALUES/ATTRIBUTES/SKILLS/ACTIONS (Rater)															
a. ARMY VALUES. Check either "YES" or "NO". (Comments are mandatory for "No" entries; optional for "Yes" entries.)												YES	NO		
<div>V</div> <div>A</div> <div>L</div> <div>U</div> <div>E</div> <div>S</div> <div>Loyalty</div> <div>Duty</div> <div>Respect</div> <div>Selfless-Service</div> <div>Honor</div> <div>Integrity</div> <div>Personal Courage</div>												1. LOYALTY: Bears true faith and allegiance to the U.S. Constitution, the Army, the unit, and other soldiers.			
												2. DUTY: Fulfills their obligations			
												3. RESPECT/EO/EEO: Treats people as they should be treated.			
												4. SELFLESS-SERVICE: Puts the welfare of the nation, the Army, and subordinates before their own.			
												5. HONOR: Lives up to all the Army values.			
												6. INTEGRITY: Does what is right – legally and morally.			
												7. PERSONAL COURAGE: Faces fear, danger, or adversity (physical and moral).			
												Bullet comments			

RATED NCO'S NAME <i>(Last, First, Middle Initial)</i>		SSN	THRU DATE						
PART IV (Rater) - VALUES/NCO RESPONSIBILITIES Specific Bullet examples of "EXCELLENCE" or "NEEDS IMPROVEMENT" are mandatory. Specific Bullet examples of "SUCCESS" are optional.									
b. COMPETENCE o Duty proficiency; MOS competency o Technical & tactical; knowledge, skills, and abilities o Sound judgment o Seeking self-improvement; always learning o Accomplishing tasks to the fullest capacity; committed to excellence <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">EXCELLENCE <small>(Exceeds Std)</small></td> <td style="text-align: center;">SUCCESS <small>(Meets std)</small></td> <td style="text-align: center;">NEEDS IMPROVEMENT <small>(Some) (Much)</small></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
c. PHYSICAL FITNESS & MILITARY BEARING o Mental and physical toughness o Endurance and stamina to go the distance o Displaying confidence and enthusiasm; looks like a soldier <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">EXCELLENCE <small>(Exceeds Std)</small></td> <td style="text-align: center;">SUCCESS <small>(Meets std)</small></td> <td style="text-align: center;">NEEDS IMPROVEMENT <small>(Some) (Much)</small></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APFT	HEIGHT/WEIGHT	
EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
d. LEADERSHIP o Mission first o Genuine concern for the soldiers o Instilling the spirit to achieve and win o Setting the example; Be, Know, Do <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">EXCELLENCE <small>(Exceeds Std)</small></td> <td style="text-align: center;">SUCCESS <small>(Meets std)</small></td> <td style="text-align: center;">NEEDS IMPROVEMENT <small>(Some) (Much)</small></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
e. TRAINING o Individual and team o Mission focused; performance oriented o Teaching soldiers how; common tasks, duty-related skills o Sharing knowledge and experience to fight, survive and win <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">EXCELLENCE <small>(Exceeds Std)</small></td> <td style="text-align: center;">SUCCESS <small>(Meets std)</small></td> <td style="text-align: center;">NEEDS IMPROVEMENT <small>(Some) (Much)</small></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
f. RESPONSIBILITY & ACCOUNTABILITY o Care and Maintenance of equipment/facilities o Soldier and equipment safety o Conservation of supplies and funds o Encouraging soldiers to learn and grow o Responsible for good, bad, right & wrong <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">EXCELLENCE <small>(Exceeds Std)</small></td> <td style="text-align: center;">SUCCESS <small>(Meets std)</small></td> <td style="text-align: center;">NEEDS IMPROVEMENT <small>(Some) (Much)</small></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
EXCELLENCE <small>(Exceeds Std)</small>	SUCCESS <small>(Meets std)</small>	NEEDS IMPROVEMENT <small>(Some) (Much)</small>							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
PART V - OVERALL PERFORMANCE AND POTENTIAL									
a. RATER. Overall potential for promotion and/or service in positions of greater responsibility. <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">AMONG THE BEST</td> <td style="text-align: center;">FULLY CAPABLE</td> <td style="text-align: center;">MARGINAL</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	AMONG THE BEST	FULLY CAPABLE	MARGINAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	e. SENIOR RATER BULLET COMMENTS 		
AMONG THE BEST	FULLY CAPABLE	MARGINAL							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
b. RATER. List 3 positions in which the rated NCO could best serve the Army at his/her current or next higher grade. <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px;"></div>									
c. SENIOR RATER. Overall performance <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> SuccessfulFairPoor </div>	d. SENIOR RATER. Overall potential for promotion and/or service in positions of greater responsibility. <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; background-color: black;"></div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> SuperiorFairPoor </div>								

NCOER COUNSELING AND SUPPORT FORM For use of this form, see AR 623-3; the proponent agency is DCS, G-1.				FOR OFFICIAL USE ONLY (FOUO) SEE PRIVACY ACT STATEMENT IN AR 623-3.	
PART I - ADMINISTRATIVE DATA					
a. NAME (Last, First, Middle Initial)		b. SSN	c. RANK	d. DATE OF RANK	e. PMOSC
f. UNIT, ORG., STATION, ZIP CODE OR APO, MAJOR COMMAND		STATUS CODE	I. RATED NCO'S EMAIL ADDRESS (.gov or .mil)		m. UIC
					n. CMD CODE
					o. PSB CODE
PART II - AUTHENTICATION					
a. NAME OF RATER (Last, First, Middle Initial)		SSN	INITIAL	LATER	LATER
				LATER	LATER
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT			RATER'S AKO EMAIL ADDRESS (.gov. or .mil)		
b. NAME OF SENIOR RATER (Last, First, Middle Initial)		SSN	INITIAL	LATER	LATER
				LATER	LATER
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT			SENIOR RATER'S AKO EMAIL ADDRESS (.gov. or .mil)		
c. NAME OF REVIEWER (Last, First, Middle Initial)		SSN	INITIAL	LATER	LATER
				LATER	LATER
RANK, PMOSC/BRANCH, ORGANIZATION, DUTY ASSIGNMENT			REVIEWER'S AKO EMAIL ADDRESS (.gov. or .mil)		
d. RATED NCO's INITIALS			INITIAL	LATER	LATER
				LATER	LATER
PART III - DUTY DESCRIPTION (Rater)					
a. PRINCIPAL DUTY TITLE			b. DUTY MOSC		
c. DAILY DUTIES AND SCOPE (To include, as appropriate, people, equipment, facilities and dollars)					
d. AREAS OF SPECIAL EMPHASIS					
e. APPOINTED DUTIES					
f. PHYSICAL FITNESS & MILITARY BEARING					
APFT		APFT DATE		HEIGHT/WEIGHT	
a. ARMY VALUES: PART IV - ARMY VALUES/ATTRIBUTES/SKILLS/ACTIONS (Rater)					
LOYALTY, DUTY, RESPECT/EO/EEO, SELFLESS-SERVICE, HONOR, INTEGRITY, PERSONAL					
TASK/ACTIONS:			PERFORMANCE SUMMARY:		

RATED NCO'S NAME (Last, First, Middle Initial)		SSN
b. COMPETENCE: <ul style="list-style-type: none"> o Duty proficiency; MOS competency o Sound judgment o Accomplishing tasks to the fullest capacity; committed to excellence o Technical & tactical; knowledge, skills, and abilities o Seeking self-improvement; always learning 		
TASK/ACTIONS:		PERFORMANCE SUMMARY:
c. PHYSICAL FITNESS & MILITARY BEARING: <ul style="list-style-type: none"> o Mental and physical toughness o Displaying confidence and enthusiasm; looks like a soldier o Endurance and stamina to go the distance 		
TASK/ACTIONS:		PERFORMANCE SUMMARY:
d. LEADERSHIP: <ul style="list-style-type: none"> o Mission first o Instilling the spirit to achieve and win o Genuine concern for soldiers o Setting the example; Be, Know, Do 		
TASK/ACTIONS:		PERFORMANCE SUMMARY:
e. TRAINING: <ul style="list-style-type: none"> o Individual and team o Teaching soldiers how; common tasks, duty-related skills o Mission focused; performance oriented o Sharing knowledge and experience to fight, survive and win 		
TASK/ACTIONS:		PERFORMANCE SUMMARY:
f. RESPONSIBILITY & ACCOUNTABILITY: <ul style="list-style-type: none"> o Care and maintenance of equipment/facilities o Conservation of supplies and funds o Responsible for good, bad, right & wrong o Soldier and equipment safety o Encouraging soldiers to learn and grow 		
TASK/ACTIONS:		PERFORMANCE SUMMARY:

Appendix B

Demographic Questionnaire

Background Information

1. Rank (circle one)	SGT	SSG	SFC	
	Years		Months	
2. Time in Service (TIS)				
3. Time in Grade (TIG)				
4. Civilian Education Level (circle <u>highest</u> level)	Non HSG	GED	HS Diploma	Some College (no degree)
	Associate Degree	Bachelor Degree	Graduate Work	Master Degree
			YES	NO
5. Received recognition for writing (HS or later)				
6. Completed college level writing class				
7. Regularly conduct quarterly counseling				
8. Regularly use the NCOER support form				

NCOER Experience

9. Based on your personal experience, when you were the RATER for an NCOER - -				
	Me	Platoon Level	Company Level	Someone above me (unknown)
a. Who completed the administrative section (Part I & II)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Who developed the bullet comments (Part IV)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Who determined the ratings (Excellence, Success, NI)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Mark the appropriate number.				
	1	2 or 3	4 or 5	More than 5
a. How many NCOERs have you been the RATER for?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. How many NCOERs have you received?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Write a **single** sentence about one of your significant leadership accomplishments.

Appendix C

Pretest

General Instructions: These questions will not be used for academic evaluations in the Advanced Leaders Course. They will only be used to assess your knowledge and skills on completing NCOERs. If you are **uncertain** of the correct answer, **please select the response “I am unsure of the answer”**. Record only those answers that you believe are correct.

GENERAL SITUATION: For this scenario you will play the role of **SSG Thatwood B. Me**, the Squad Leader for the 2nd Squad, 3rd Platoon, A Company, 1st Battalion (CAB), 56th Infantry Regiment assigned to the 2nd Brigade (HBCT), 21st Infantry Division. 1-56 INF is a FORSCOM unit posted to Camp Swampy, Georgia. The 1-56 INF was redeployed from Iraq in November 2010 and after a period of recovery followed by assignment turbulence, the unit is now focused on training for full spectrum operations.

Your squad has gone through a period of individual skills training that included Expert Infantry Badge (EIB) training and testing. You are now transitioning to small unit collective training, gunnery, and field training that will culminate with a training deployment (in three and one-half months) to the National Training Center at Fort Irwin, CA against the opposing force (OPFOR) regiment, a full spectrum operations rotation.

For this problem scenario, today is Friday 21 October 2011. You are preparing for your final counseling session with SGT Public and completing his NCOER.

SPECIAL SITUATION: Sergeant John Q. Public, your Bravo Fire Team Leader (TL) is being reassigned; departing 28 October 2011. SGT Public has been the TL for 10 months, assuming duties upon return from convalescent leave. You took over the Squad 4 months ago. Your predecessor gave SGT Public his first NCOER, a “Change of Rater” with an end date of 30 June 2011.

You will be provided the working file for his NCOER that will assist you in completing this rating prior to his departure for his next duty station, Fort Hood, TX. The working file will contain the following items for your review and use:

- A partially completed NCO Evaluation Report (DA Form 2166-8)
- A partially completed NCOER Counseling & Support Form (DA Form 2166-8-1), initial counseling on 14 July 2011
- A Developmental Counseling Form (DA Form 4856), from 26 Aug 2011
- SGT Public’s file with miscellaneous orders, records, and notes:
 - Appointment orders, Company Energy and Water Management NCO
 - Emergency Leave Request and Extension (28 Aug – 2 Oct)
 - Memo: A Co. EIB testing results (15 Sep)
 - Memo: Installation Energy and Water Conservation Inspection (22 Sep)
 - APFT Scorecard with data for 01/07/11, 03/18/11, and 09/23/11

You may use the materials provided, AR 623-3, and DA Pam 623-3 to answer questions that follow. **Record your answers on form provided.** Turn in all materials when finished.

There are rules and principles that guide writing bullets for NCOERs. Bullets should provide the reader with details and examples of the rated NCO's performance, as well as providing support and justification for the selected rating. From the list below identify the rules and principles that should be used to create bullets from your observations and counseling records.

For items 1 through 6 those techniques that **should** be used, enter a "Y" for **YES**; for those techniques that **should not** be used, enter an "N" for **NO**; for items that you are unsure of **or** do not know, enter a "U" for **UNSURE**.

- ____ 1. Only include bolded, underlined, or italicized text for special emphasis.
- ____ 2. Separate bullets by double-spacing.
- ____ 3. Begin with a small letter "o" to designate the start of a bullet.
- ____ 4. Only complete and grammatically correct sentence bullets may use two lines.
- ____ 5. Reuse bullets for more than one value or responsibility, when appropriate.
- ____ 6. Phrase bullet may be used but are limited to one line of text.

For items 7 through 14 refer to SGT Public's counseling files.

7. What are the correct entries for boxes "i. RATED MONTHS" and "j. NON-RATED CODES" in "PART I – ADMINISTRATIVE DATA" of the **NCO EVALUATION REPORT**?

- A. i. RATED MONTHS 4; j. NON-RATED CODES ____ (leave blank; make no entry)
- B. i. RATED MONTHS 4; j. NON-RATED CODES E
- C. i. RATED MONTHS 3; j. NON-RATED CODES ____ (leave blank; make no entry)
- D. i. RATED MONTHS 3; j. NON-RATED CODES E
- E. i. RATED MONTHS 3; j. NON-RATED CODES Z
- F. **I am unsure of the answer.**

8. While reviewing Part III c. **DAILY DUTIES AND SCOPE** of SGT Public's NCOER, you determine that it is not fully in compliance with the guidance and instructions in DA Pam 623-3, Evaluation Reporting System. Select from the item below that should be included in this section of the NCOER.

- A. Important routine duties and responsibilities.
- B. Number of Soldiers supervised.
- C. Equipment and facilities for which the rated NCO is responsible and their dollar value.
- D. All the above.
- E. **I am unsure of the answer.**

9. In reviewing SGT Public's records you determine that a rating of **EXCELLENCE** is appropriate for item c. in Part IV. **PHYSICAL FITNESS AND MILITARY BEARING**. Based on the information available, write a bullet that fully supports the **EXCELLENCE** rating.

(Write [print] your bullet on the answer sheet in the space provided.)

10. Examples of unit achievements or performance are sometimes used in Part IV. d. **LEADERSHIP** and/or e. **TRAINING**. During the rating period, three (3) members of Bravo Fire Team passed all requirements and were awarded the Expert Infantry Badge (EIB). How could you reflect this information on SGT Public's NCOER?

- A. Testing and award occurred during the period that SGT Public was on leave. It was non-rated time; no comments can be made on the NCOER.
- B. SGT Public met the standard. No narrative bullet is required for SUCCESS ratings.
- C. The Bravo Team Soldiers exceeded the established standard, but SGT Public was not present, did not finish their training, and did not lead them through testing. No bullet comment is appropriate.
- D. A bullet comment in **LEADERSHIP** or **TRAINING** could state, "o prepared all 3 subordinates for the Expert Infantry Badge, all were tested and awarded the EIB".
- E. **I am unsure of the answer.**

11. You determine that SGT Public's performance in **RESPONSIBILITY & ACCOUNTABILITY** (Part IV. f.) should receive an **EXCELLENCE** rating in part for the Alpha Company's Energy and Water Management results for the Installation Inspection. Based on the information available, write a bullet that fully supports the **EXCELLENCE** rating.

(Write [print] your bullet on the answer sheet in the space provided.)

12. You determine that SGT Public's performance in **TRAINING** (Part IV. e.) should receive an **EXCELLENCE** rating. Select the bullet that best supports this rating.

- A. o conducted daily additional PT and Warrior Skills training preparing his Soldiers for EIB testing; all his Soldiers qualified for the EIB
- B. o improved marksmanship training assisting all his Soldiers to qualify Sharpshooter or better
- C. o assisted Soldiers and superiors to improve APFT scores, entire Fire Team and Platoon Leader met or exceeded company APFT standards
- D. o always assigned difficult classes; one of the best trainers in the platoon
- E. **I am unsure of the answer.**

13. You want to provide some strong bullets to highlight SGT Public's demonstrated **LEADERSHIP** (Part VI. d.) during the rating period. The bullet that you write needs to provide substantive, quantifiable results, or performance showing how he **set the example** (Be, Know, Do). Select the statement below that provides the best input for a bullet.

- A. He scored 272 on the APFT and obtained 90 points or more in all events.
- B. He routinely led platoon PT and conducted extra training and PT.
- C. He now meets height and weight standards and has no physical profile.
- D. He conducted regular counseling sessions with subordinates to correct deficiencies and shortcomings.
- E. **I am unsure of the answer.**

14. In Part IV section a. **ARMY VALUES** of the NCOER, **YES** is indicated all the boxes. It is apparent from the file that SGT Public has a strong sense of duty. Write a bullet that provides a quantitative or measurable example of SGT Public's fulfillment of assigned duties or obligations.

(Write [print] your bullet on the answer sheet in the space provided.)

Items 15 through 17 cover basic rules and principles of the NCOER Evaluation Reporting System. You may refer to AR 623-3 and DA Pam 623-3, if required.

15. When selecting value ratings, SUCCESS indicates that the rated NCO meets the standard and is fully competitive for promotion and schooling. Your goal in counseling is to encourage and guide your subordinates to attain and maintain this level. Identify the bullet below that **would not** support or justify a SUCCESS rating.

- A. o sustains a comprehensive cross-training program for Soldiers in his team
- B. o continually seeking improvement, completed one college level course
- C. o encouraged all Soldiers to meet company standards on APFT
- D. o led his unit to qualify as Marksman during semi-annual qualification
- E. o led Soldiers to complete the company 5-mile run
- F. **I am unsure of the answer.**

16. Ratings of NEEDS IMPROVEMENT indicate that the rated NCO has missed or failed to meet standards for a specific Army value or responsibility. A rating of NEEDS IMPROVEMENT should not be a surprise to the rated NCO. If the NCO received an adverse administrative action or an Article 15 during the rating period, indicate how to include this information in an NCOER bullet.

- A. For an Article 15, state "Article 15" and include the charge and specification
- B. For an Article 15, state "Article 15" and include the punishment adjudged
- C. For an adverse action, state the level of command taking the action and results
- D. State the NCO's conduct or performance that caused the action or punishment
- E. **I am unsure of the answer.**

17. In Part IV section a. **ARMY VALUES** of the NCOER the **rater** is required to provide his evaluation of the **rated NCO's** adherence to Army values through his attributes, skills, and actions. An "**X**" must be placed in the appropriate rating box in each section. There is limited space provided for bullets. Which rule or guide below **is not appropriate or correct** for the narrative bullets used in the section?

- A. Quantitative or substantial bullets are to be used to explain an area where the rated NCO is particularly strong or where he is below his peers.
- B. Specific bullets are mandatory for all "NO" entries.
- C. Bullets are not mandatory for "YES" entries.
- D. Bullets may be reused on the back in Part IV. sections b. – f., where appropriate.
- E. **I am unsure of the answer.**

Appendix D

Posttest

ALC NCOER Diagnostic Test 2

(Ver. 005.0, 13 Sept 2011)

General Instructions: These questions **will not** be used for academic evaluations in the Advanced Leaders Course. They will only be used to assess your knowledge and skills on completing NCOERs. If you are **uncertain** of the correct answer, **please select the response “I am unsure of the answer”**. Record only those answers that you believe are correct.

GENERAL SITUATION: For this scenario you will play the role of **SSG None Better**, the Squad Leader for the 2nd Squad, 3rd Platoon, A Company, 1st Battalion (CAB), 71th Infantry Regiment assigned to the 2nd Brigade (HBCT), 21st Infantry Division. 1-71 INF is a FORSCOM unit posted to Camp Swampy, Georgia. The 1-71 INF was redeployed from Iraq in November 2010 and after a period of recovery followed by assignment turbulence, the unit is now focused on training for full spectrum operations.

Your squad has gone through a period of individual skills training. You are now transitioning to small unit collective training, and field training that will culminate with a training deployment (in three and one-half months) to the Joint Readiness Training Center at Fort Polk, LA against the opposing force (OPFOR) regiment, a full spectrum operations rotation.

For this problem scenario, today is Friday 21 October 2011. You are preparing for your final counseling session with SGT Makit and completing his NCOER.

SPECIAL SITUATION: You are being reassigned with a departure of 28 October 2011. You must give Sergeant Hardly W. Makit his first NCOER, which will be a “Change of Rater”. SGT Makit has been your Bravo Fire Team Leader (TL) since January 2011, assuming duties just after his promotion from Specialist to Sergeant.

You will be provided the working file for his NCOER that will assist you in completing this rating prior to your departure. The working file will contain the following items for your review and use:

- A partially completed NCO Evaluation Report (DA Form 2166-8)
- A partially completed NCOER Counseling & Support Form (DA Form 2166-8-1), initial counseling on 14 Jan 2011
- 3 Developmental Counseling Forms (DA Form 4856), dated: 18 Apr., 22 July, and 22 Sept. 2011
- SGT Public's file with miscellaneous orders, records, and notes:
 - Appointment orders, Company Representative to Highland High School
 - 2 Memos: Pertaining to equipment loss (22 Sep)
 - APFT Scorecard with data for 11/15/10, 05/18/11, and 10/17/11

You may use the materials provided, AR 623-3, and DA Pam 623-3 to answer questions that follow. **Record your answers on form provided.** Turn in all materials when finished.

There are rules and principles that guide writing bullets for NCOERs. Bullets should provide the reader with details and examples of the rated NCO's performance, as well

as providing support and justification for the selected rating. From the list below identify the rules and principles that should be used to create bullets from your observations and counseling records.

For items 1 through 6 those techniques that **should** be used, enter a “Y” for **YES**; for those techniques that **should not** be used, enter an “N” for **NO**; for items that you are unsure of **or** do not know, enter a “U” for **UNSURE**.

- ____ 1. Phrase bullet may be used but are limited to one line of text.
- ____ 2. Only complete and grammatically correct sentence bullets may use two lines.
- ____ 3. Only include bolded, underlined, or italicized text for special emphasis.
- ____ 4. Begin with a small letter “o” to designate the start of a bullet.
- ____ 5. Reuse bullets for more than one value or responsibility, when appropriate.
- ____ 6. Separate bullets by double-spacing.

For items 7 through 14 refer to SGT Makit’s counseling files.

7. What are the correct entries for boxes “i. RATED MONTHS” and “j. NON-RATED CODES” in “PART I – ADMINISTRATIVE DATA” of the **NCO EVALUATION REPORT**?

- A. i. RATED MONTHS 7; j. NON-RATED CODES ____ (leave blank; make no entry)
- B. i. RATED MONTHS 7; j. NON-RATED CODES E
- C. i. RATED MONTHS 7; j. NON-RATED CODES E
- D. i. RATED MONTHS 9; j. NON-RATED CODES Z
- E. i. RATED MONTHS 9; j. NON-RATED CODES ____ (leave blank; make no entry)
- F. **I am unsure of the answer.**

8. Reviewing Part III c. **DAILY DUTIES AND SCOPE** of SGT Makit's NCOER and consider the guidance and instructions in DA Pam 623-3, Evaluation Reporting System. Select the item below that best describes this section of the NCOER.

- A. Daily duties and scope appear to be complete.
- B. Important routine duties and responsibilities seem to be omitted.
- C. Number of Soldiers supervised was omitted.
- D. Equipment and facilities for which the rated NCO is responsible and their dollar value was omitted.
- E. **I am unsure of the answer.**

9. In reviewing SGT Makit's records you determine that a rating of **NO** is appropriate for item a. 6. in Part IV. **ARMY VALUES/ATTRIBUTES/SKILLS/ACTIONS**. Based on the information available, write a bullet that fully supports the **NO** rating.

(Write [print] your bullet on the answer sheet in the space provided.)

10. During the rating period, the Battalion Commander received very complementary comments from the District School Board and City Council for a static display and color guard for which SGT Makit was the NCOIC. Based on the information available, write a bullet that would indicate performance that "Exceeds Standard" in Part IV.b., **CCOMPETENCE**.

(Write [print] your bullet on the answer sheet in the space provided.)

11. During the rating period, SGT Makit had a record of being late for early formations. Based on the information available, write a bullet that would support a **NEEDS IMPROVEMENT** rating in Part VI.d., **LEADERSHIP**.

(Write [print] your bullet on the answer sheet in the space provided.)

12. During the rating period, SGT Makit's daily appearance was below that expected of an NCO. Based on the information available, write a bullet that would support a **NEEDS IMPROVEMENT** rating in Part VI.d., LEADERSHIP.

(Write [print] your bullet on the answer sheet in the space provided.)

13. During the rating period, SGT Makit's personal and fire team's APFT scores continued to drop. Based on the information available, write a bullet that would support a **NEEDS IMPROVEMENT** rating in Part VI.c., PHYSICAL FITNESS AND MILITARY BEARING.

(Write [print] your bullet on the answer sheet in the space provided.)

14. In Part V section a. how would you rate SGT Makit's "Overall potential for promotion and/or service in positions of greater responsibility."?

- A. Among the best
- B. Fully capable
- C. Marginal
- D. Leave the rating blank; **overall potential** is not rated on the initial NCOER.
- E. **I am unsure of the answer.**

Item 15 relates to basic rules and principles of the NCOER Evaluation Reporting System. You may refer to AR 623-3 and DA Pam 623-3, if required.

15. In Part IV section a. **ARMY VALUES** of the NCOER the **rater** is required to provide his evaluation of the **rated NCO's** adherence to Army values through his attributes, skills, and actions. An "**X**" must be placed in the appropriate rating box in each section. There is limited space provided for bullets. Which rule or guide below **is not appropriate or correct** for the narrative bullets used in the section?

- A. Quantitative or substantial bullets are to be used to explain an area where the rated NCO is particularly strong or where he is below his peers.
- B. Specific bullets are mandatory for all "NO" entries.
- C. Bullets are not mandatory for "YES" entries.
- D. Bullets may be reused on the back in Part IV. sections b. – f., where appropriate.
- E. **I am unsure of the answer.**

Appendix E
Post Training Questionnaire

Post Training Questionnaire

**Please fill-in the bubble to indicate your level of understanding
“Prior to Today’s instruction” and “Now”, following the instruction.**

		Need some explanation	Understand Somewhat	Got it	Understand Very Well	Could Teach This to Others
1. Significance of conducting meaningful “counseling” and documenting the results.	Prior to Today	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Significance of using the “NCOER support form” to fully document accomplishments and performance.	Prior to Today	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Importance of including meaningful bullets on the NCOER that accurately document performance.	Prior to Today	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Significance of supporting documentation in developing ratings and meaningful bullets on the NCOER.	Prior to Today	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please fill-in the bubble to indicate your feelings toward the instruction you received today.

	Not Very Useful	Don’t Know	Useful	Very Useful
1. Hand-outs and examples provided to support the instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Hand-outs for future reference.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Guided use of publications (regulations and pamphlets) throughout the instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please fill-in the bubble to indicate your feelings toward the instruction you received today.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. The instruction gave me a much better understanding of the NCOER process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The instruction prepared me to perform my duties as a rater.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The instruction prepared me to develop more meaningful and accurate NCOERs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The time devoted to explaining concepts was adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. The instruction covered issues and nuances in the NCOER process that were very helpful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. The instruction provided valuable insights on how to effectively develop appropriate bullets for an NCOER.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. The instruction improved my ability to write an NCOER that accurately represents the NCO's performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. The instruction provided me a better appreciation for accessing and using Army publications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. The instruction assisted me in knowing what I need to do to receive an "Excellent" rating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The instruction has motivated me to ensure my subordinates receive accurate NCOERs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. The instruction has motivated me to ensure that my NCOER accurately reflects my performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. What aspects of the instruction were most beneficial? Please explain.

13. What aspects of the instruction were least beneficial? Please explain.

14. What additional topics should be included in the NCOER instruction?

Embedded Secure Document

The file http://armypubs.army.mil/eforms/pdf/a2166_8_1.pdf is a secure document that has been embedded in this document. Double click the pushpin to view.

